

# Interrelated Water Management Plan Program Funds Application

**Deadline for Applications August 28, 2006**

**Project Sponsor(s):** Nemaha Natural Resources District

**Project Name:** Nemaha NRD IWMPPF Request

**Total Amount Funds Requested from the Interrelated Water Management Plan Program Fund (IWMPPF):**

**\$ 120,000**

**Years of funding requested (select one):**

**1**

**2**

**3**

**Amount Requested from the Fund Year 1:**

**\$ 40,000**

**Amount of Local Match Offered Year 1 (must equal at least 20% of funding requested from the IWMPPF):**

**\$ 10,000**

**Contact - Name:** Chuck Wingert

**Title:** Water Resources Manager

**Address:** 62161 US Highway 136

**Tecumseh, NE 68450**

**Daytime Phone:** 402.335.3325 **Fax:** 402.335.3265

**E-mail:** cwingert@nemahanrd.org

**Is this a continuation request for a project previously funded by the Commission?** YES

**NO**

**Project Overview:** In **300 words or less** provide an overview of the project for which you seek funding. If you are asking the Natural Resources Commission to fund only a portion of the project, indicate the components for which you seek funding.

See following page

On behalf of the sponsor(s) named above, I hereby certify that the information contained in this application, including all attachments, is true, accurate and complete.

\_\_\_\_\_  
Authorized Signature of Natural Resources District

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
Typed or Printed Name of Authorized Signatory

\_\_\_\_\_  
Typed or Printed Title

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## **PROJECT OVERVIEW**

This project is designed to provide the Nemaha Natural Resources District with the proper scientific data to develop an appropriate groundwater flow model for a portion of the District that is thought to contain all four principle aquifer types. Continued drought and recent high capacity well development within the proposed study area has resulted in conflicts between local groundwater users. The Nemaha NRD is currently in the process of updating the quantity portion of our Groundwater Management Plan and feels that this project would contribute significantly to making sound management decisions.

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## APPLICATION BUDGET SUMMARY

### SUMMARY for All Years of Project

(If the project is for one year only, use this only page and delete the following budget pages)

Column A	Column B	Column C	Column D	Column E	Column F
Source of Funds ►	Interrelated Water Plan Program Funds	Local Match Funds			TOTALS ▼
Budget Category as it relates to activities described above ▼					
1. Seek and hire hydrogeologic professional	12,000.00	3,000.00			\$15,000
2. Begin hydrogeologic field investigations	8,000.00	2,000.00			\$10,000
3. Begin observation well installation with transducers	16,000.00	4,000.00			\$20,000
4. Purchase groundwater flow model software and attend training course	4,000.00	1,000.00			\$ 5,000
5. Complete hydrogeologic investigations – testholes, observation wells & pump tests	20,000.00	5,000.00			\$25,000
6. Hydrogeologic professional – project oversight & modeling	20,000.00	5,000.00			\$25,000
7. Hydrogeologic professional – project oversight, modeling & ENWRA methods	20,000.00	5,000.00			\$25,000
8. Verify ENWRA data collection methods	20,000.00	5,000.00			\$25,000
<b>TOTALS ►</b>	<b>\$120,000</b>	<b>\$ 30,000</b>			<b>\$150,000</b>

# Interrelated Water Management Plan Program Funds Application

**Deadline for Applications August 28, 2006**

## BUDGET YEAR: ONE

(This page is used by multi-year grants only. If your project is not a multi-year grant, then ignore or delete this page.)

Column A	Column B	Column C	Column D	Column E	Column F
Source of Funds ▶	Interrelated Water Plan Program Funds	Local Match Funds			TOTALS ▼
Budget Category as it relates to activities described above ▼					
1. Seek and hire hydrogeologic professional	12,000.00	3,000.00			\$15,000
2. Begin hydrogeologic field investigations	8,000.00	2,000.00			\$10,000
3. Begin observation well installation with transducers	16,000.00	4,000.00			\$20,000
4. Purchase groundwater flow model software and attend training course	4,000.00	1,000.00			\$ 5,000
5.					
6.					
7.					
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9.					
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11.					
<b>TOTALS ▶</b>	<b>\$ 40,000.00</b>	<b>\$10,000.00</b>			<b>\$ 50,000.00</b>

# Interrelated Water Management Plan Program Funds Application

**Deadline for Applications August 28, 2006**

## BUDGET YEAR: TWO

(This page is used by multi-year grants only. If your project is not a multi-year grant, then ignore or delete this page.)

Column A	Column B	Column C	Column D	Column E	Column F
Source of Funds ►	Interrelated Water Plan Program Funds	Local Match Funds			TOTALS ▼
Budget Category as it relates to activities described above ▼					
1. Complete hydrogeologic investigations – testholes, observation wells & pump tests	20,000.00	5,000.00			\$25,000
2. Hydrogeologic professional – project oversight & modeling	20,000.00	5,000.00			\$25,000
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12.					
13.					
<b>TOTALS ►</b>	<b>\$ 40,000.00</b>	<b>\$10,000.00</b>			<b>\$ 50,000.00</b>

# Interrelated Water Management Plan Program Funds Application

**Deadline for Applications August 28, 2006**

## BUDGET YEAR: THREE

(This page is used by multi-year grants only. If your project is not a multi-year grant, then ignore or delete this page.)

Column A	Column B	Column C	Column D	Column E	Column F
Source of Funds ►	Interrelated Water Plan Program Funds	Local Match Funds			TOTALS ▼
Budget Category as it relates to activities described above ▼					
1. Hydrogeologic professional – project oversight, modeling & ENWRA methods	20,000.00	5,000.00			\$25,000
2. Verify ENWRA data collection methods	20,000.00	5,000.00			\$25,000
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14.					
TOTALS ►	\$ 40,000.00	\$10,000.00			\$ 50,000.00

# Interrelated Water Management Plan Program Funds Application

**Deadline for Applications August 28, 2006**

1. Have other sources of funding not listed in the Budget Worksheet been approached for project support? If yes, name them and explain the outcome of your request.

No

2. Are all of the matching funds in the Budget Worksheet confirmed? If not, please identify those entities and list the date when confirmation is expected. Explain how you will implement the project if these sources do not confirm participation.

Yes

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An electronic version of the grant application form and information on grant guidelines and timetable can be found on the Department of Natural Resources Web Site: <http://dnr.ne.gov>

## **Application Submission:**

1. One paper copy of the grant application with the required signatures is to be submitted by **August 28, 2006** to:

Jeremy Gehle  
Nebraska Department of Natural Resource  
301 Centennial Mall South  
Lincoln, NE 68509-4676

2. One electronic copy is to be emailed by **August 28, 2006** to:

Jeremy Gehle at: [jgehle@dnr.ne.gov](mailto:jgehle@dnr.ne.gov)

## **Nemaha NRD Interrelated Water Management Plan Program Funds Request**

### **Introduction**

The southeastern portion of Nebraska lies within the glacial drift groundwater region of the State. The principle aquifer system of interest for the water management plan is of limited extent and is comprised of paleovalley, alluvial, bedrock and glacial drift aquifer units. Several years of continued drought and a recent increase in high capacity well development has prompted the District to place a temporary two-year closure to the issuance of well permits for all wells designed to yield greater than 50 gallons per minute. During this two-year suspension, the District will be updating its Groundwater Management Plan (GWMP) to better address existing and future aquifer sustainability and collect additional data to better define the geologic framework of the vulnerable aquifer areas. In order for the District to expedite this process, the Interrelated Water Management Plan Program funds are being sought to assist with the data collection efforts and to hire a hydrogeologic professional.

The geology of the Nemaha Natural Resources District is a complex composition of fine to coarse grained alluvium and unconsolidated fine grained glacial deposits containing localized interbedded sand and gravel. These deposits overlie Paleozoic limestone and shale bedrock formations. The four principle aquifers mentioned above (paleovalley, alluvial, bedrock and glacial) range in saturated thickness from less than 50 feet to over 400 feet. Groundwater well yields throughout most of the District are generally less than 50 gallons per minute and are often highly mineralized. Sand and gravel deposits in buried paleovalleys and along some stream valleys are the highest yielding and most significant sources of groundwater but are of limited extent.

Historically, high capacity well development occurred predominantly within the paleovalley and alluvial aquifer formations. However, over the past few years, there has been a steady increase in development of high capacity wells in the glacial aquifers that could be considered marginally supportive. With this increase in development, annual groundwater levels have continually declined and conflicts between users are increasing. In an effort to properly address these conflicts, the hydrogeologic framework and interconnection of the paleovalley and glacial drift



aquifer units needs to be defined in order to adequately evaluate the capacity and sustainability of these aquifers and to delineate their boundaries.

### **Project Objectives**

The primary objectives of the project are to investigate the hydrogeologic framework and interconnection of the paleovalley, alluvial, bedrock and glacial aquifers within the confines of the Nemaha NRD. Specifically, the proposed study will compile existing data and target a specific study area (see Figure #1), referred herein as the Talmage/Brock Area. Additional data needs will be identified and the geologic framework and aquifer boundaries will be defined and mapped. Datasets will then be developed for use with numerical groundwater flow models. The flow models will assist the District with appropriate groundwater management decisions for this and similar hydrogeologic areas.

### **Project Tasks**

Study objectives will be accomplished in three phases of a 3-year study. During the first phase data collection will be initialized. These data will include compilation and aggregation of published and unpublished information and the preparation of a bibliography. A conceptual hydrogeologic map will also be created, using a Geographical Information System (GIS), to assist with the aquifer investigation. A hydrogeologic professional will be sought to conduct a technical review of the data assembled, determine additional data needs and to further delineate the specific study area. The hydrogeologist will also be responsible for providing and conducting a fieldwork plan for additional data collection efforts.

Hydrogeologic investigations will be undertaken during phase two of the study. The investigation will include testhole drilling in conjunction with geophysical logging to compare borehole resistivity values with lithologic logs at approximately six to ten key locations within the study area. Based upon the testhole data and the hydrogeologist's recommendations, approximately four to six observation wells will be installed with continuous recording pressure transducers to record static water level fluctuations throughout the year. Constant rate drawdown pump and recovery tests will be conducted on these wells to determine aquifer transmissivity values. Water samples will also be collected to determine groundwater quality and residence

age. The initial hydrogeologic map will be updated and datasets developed for use with numerical groundwater flow models.

Phase three of the project will be dedicated to calibrating and analyzing the numerical groundwater flow model(s). The model(s) will be used to predict the impacts of existing and possible future development of high capacity wells within the study area as well as assist with developing appropriate management decisions in updating the quantity portion of the District's Groundwater Management Plan. The model(s) will also be used to assist with identifying and locating additional sites for further data collection efforts.

### **Project Timeline**

This is a three year project proposal designed to better define and delineate the geologic framework of the Talmage/Brock study area as well as similar aquifer systems within the District. The data collected will also be used to update the groundwater quantity management portion of the District's GWMP. The groundwater flow model and the updated plan will assist with managing and regulating current and future high capacity well development within the study area and other areas of similar hydrogeology. The accomplishments, knowledge gained and the tools used in the ENWRA pilot studies will also be incorporated with this project in Year three.

#### **Year 1:**

- Collect and assemble existing hydrogeologic data
- Seek and hire a hydrogeologic professional
- Begin hydrogeologic field investigations and installing observation wells

#### **Year 2:**

- Complete the hydrogeologic field investigations
- Continue observation well data collection
- Delineate aquifer boundaries and create groundwater model datasets.
- Begin groundwater model calibration and analysis
- Complete updates to GWMP and implement.

#### **Year 3:**

- Continue observation well data collection
- Continue groundwater flow model analysis and expand size of model area
- Use this project's data as "ground truthing" to verify ENWRA data collection methods

## Partnerships

A hydrogeologic professional will be sought to coordinate and analyze field data collection efforts as well as define the geologic framework of the study area. The Nemaha NRD will be involved with all phases of the project. Technical expertise and data will be sought from the following project partners throughout the project period: the U.S. Geological Survey, UNL Conservation and Survey Division, Eastern Nebraska Water Resources Assessment (ENWRA) group and the Nebraska Department of Natural Resources.

## Budget

### Year 1

Task	Estimated Cost
1. Collect and assemble existing hydrogeologic data (NNRD)	---
2. Seek and hire hydrogeologic professional	\$ 15,000
3. Begin hydrogeologic field investigations - drilling testholes with geophysical logging	\$ 10,000
4. Begin installing observation wells with pressure transducer recorders	\$ 20,000
5. Purchase numerical groundwater model software and attend training course	\$ 5,000
<b>Total</b>	<b>\$ 50,000</b>

### Year 2

Task	Estimated Cost
1. Complete the hydrogeologic field investigations – testholes, observation wells & pumping tests	\$ 25,000
2. Hydrogeologic professional – a. Delineate aquifer boundaries and create groundwater model datasets b. Begin groundwater model calibration and analysis	\$ 25,000
3. Complete updates to GWMP and implement (NNRD)	---
<b>Total</b>	<b>\$ 50,000</b>

### Year 3

Task	Estimated Cost
1. Continue observation well data collection	---
2. Expand size of model area	---
3. Hydrogeologic professional – a. Analysis and calibration of the numerical groundwater flow model b. Coordination and implementation of ENWRA data collection methods	\$ 25,000
4. Use this projects' data as “ground truthing” to verify ENWRA data collection methods	\$ 25,000
<b>Total</b>	<b>\$ 50,000</b>

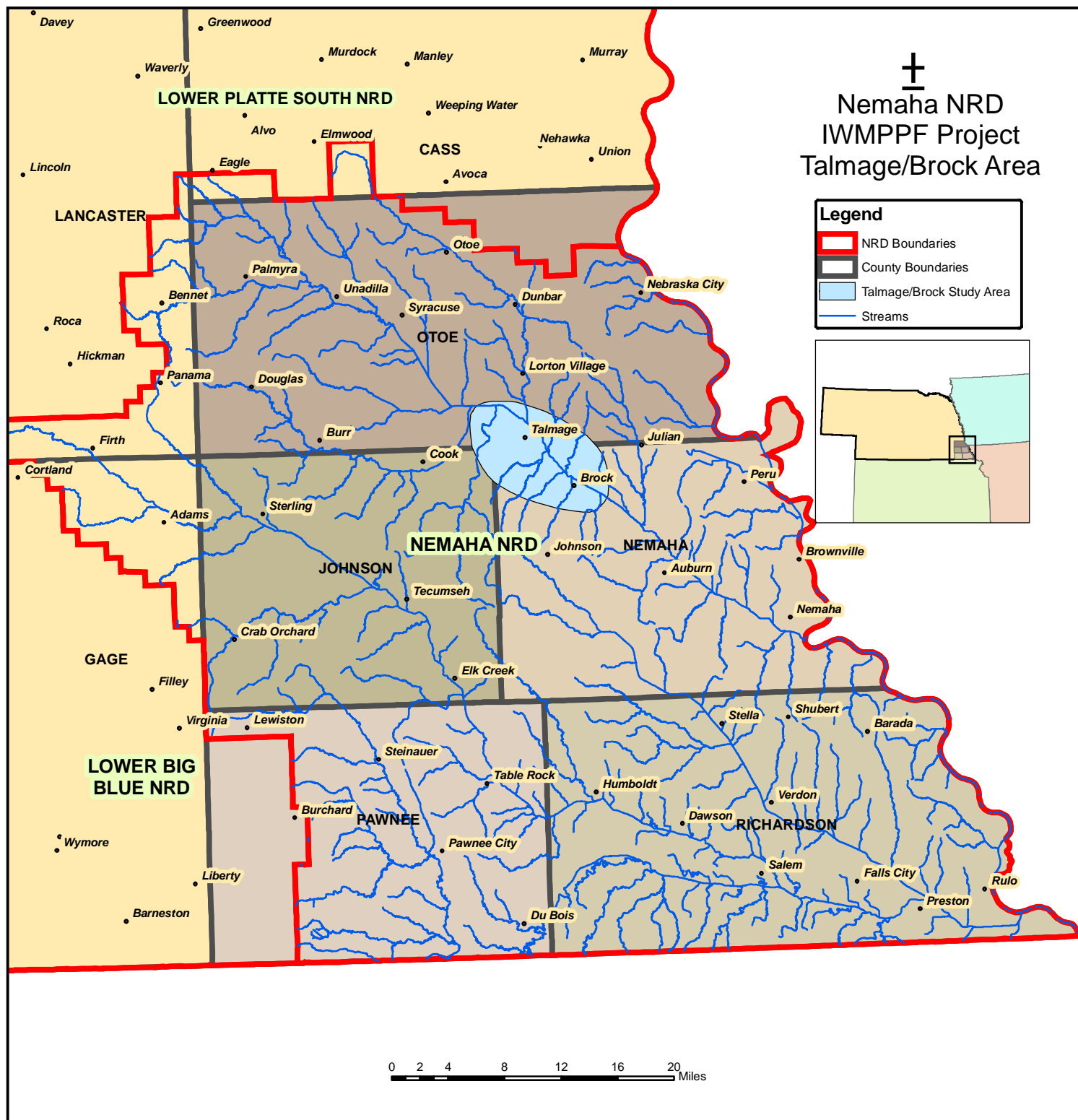


Figure #1 - Talmage/Brock Area